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Introduction

What Is Science?

What is science to young children? Is it something that they know is a part of their world? Is it a textbook in the classroom? Is it a tadpole changing into a frog? A sprouting seed, a rainy day, a boiling pot, a turning wheel, a pretty rock, or a moonlit sky? Is science fun and filled with wonder and meaning? What is science to a child?

Science offers you and your eager students opportunities to explore the world around you, and make connections between the things you experience. The world becomes your classroom, and you, the teacher, a guide.

Science can, and should, fill children with wonder. It should cause them to be filled with questions and the desire to discover the answers to their questions. And, once they have discovered answers, they should be actively seeking new questions to answer.

The books in this series give you and the students in your classroom the opportunity to learn from the whole of your experience—the sights, sounds, smells, tastes, and touches, as well as what you read, write about, and do. This whole-science approach allows you to experience and understand your world as you explore science concepts and skills together.

What Is a Machine?

What is a machine? Just what makes a machine a machine? What are the parts? What do they do? Why do they do it? Why is a machine called a simple machine? What is work? How does a machine do work? These are just a few of the questions students will have on the subject of simple machines.

Webster, in its definition of a machine, states that it consists of interrelated parts with separate functions, used in the performance of some kind of work. The two key phrases that will concern us as we investigate simple machines are "interrelated parts" and "performance of work." In this investigation, the students will discover the answers to their many questions about machines and get a glimpse of some modern concepts about computers and satellites—the machines of the future!

Just the Facts

Just what are machines and what do they do? A good place to begin the study of machines is with this question. Due to their limited experiences many students have misconceptions about machines. Have a brainstorming session listing machines and their functions—as many as the class can name.

If Webster defines a machine as consisting of interrelated parts with separate functions used in the performance of some kind of work, then may humans also be considered machines? How does this concept fit into the lists that were made during the brainstorming session?

In this section the students will investigate several ways to power a machine. From wind power to a simple electric motor, whatever makes a machine run is increasingly a concern to our environmentally conscious generation. Working with simple hands-on models will help students understand the variety of resources that we have and some of the problems and advantages with each one.

We will also look inside a machine to investigate ball bearings and gears. We will discover how ball bearings can cut down friction by providing a moving surface (rather than a stationary one) for parts that have to rub against each other. Gears make it possible to move action from one place to another without wasting energy. They also can change the direction of motion, making it possible for the up and down motion of a weight inside a clock to change to the circular motion of the hands on the face of the clock.

Machines do work for us. But what is work? To the scientist, the word has a different meaning than it does to us. We say that we have worked hard when we have studied a lesson or exercised. To a scientist, work means a force that moves an object a certain distance. Work involves only forces and movement. Machines help us to do work, but work must be put into them to make work come out. This work is usually in the form of energy such as wind, water, or electricity. The work that comes out is always less than what went into it. Much of the work is lost due to friction, noise, and heat!

Machines do many things for us, but always at a price. Earth resources used for energy and pollution are the cost that we have had to pay for the luxury of machinery. The children in our classes will one day be designing a new generation of machines that will minimize the disadvantages while increasing usefulness.

Wind Machines

Question

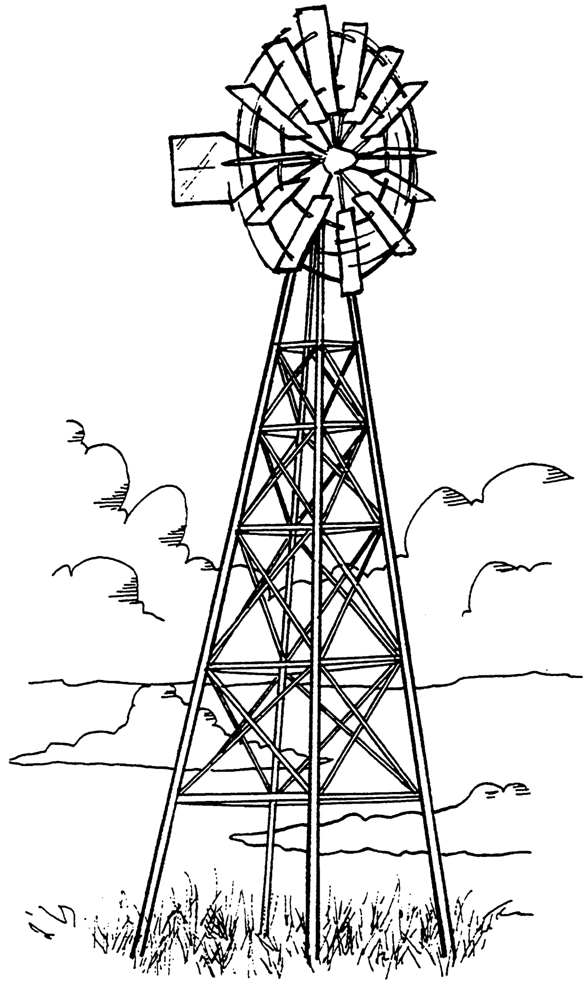
How do machines use the power of the wind?

Setting the Stage

- Show students pictures of Holland's windmills, farm windmills, and the wind machines used to generate electricity.
- Discuss with students a machine's need for a power source, and how the machines in the pictures use the wind.

Materials Needed for Each Individual

- pencil with eraser
- straight pin
- two small beads that will fit on the pin
- pinwheel pattern (page 11)
- colored markers or crayons



Procedure *(Student Instructions)*

1. Reproduce the pinwheel pattern onto construction paper or card stock.
2. Cut out the pattern. Cut on the solid lines and bend the flaps.
3. Before assembling the pinwheel, decorate it.
4. Place one bead on the pin. Stick the pin through the pinwheel, making sure to include all of the spokes. Place another bead on the pin and then stick the pin into the pencil eraser.
5. Investigate other wind directions. How does the pinwheel have to be aligned in order to catch the most wind and spin the fastest?

Extensions

- Have students make a model of a wind machine using the pinwheel as part of the model. Have them use shoe boxes and cardboard for the other parts of the model.
- Have students research the other energy sources for machines.

Closure

In their simple machines journals, have students draw pictures or write paragraphs describing how the wind might be used to power something that they use every day, like a bicycle, T.V., car, skateboard, etc.

The Big Why

We cannot see air, but we can feel the movement of air and wind. The wind has great energy to make things move and to make machines run.

Wind Machines *(cont.)*

Cut out the pattern. Cut on the solid line and bend flaps so that the dots are on top of the centre spot. The pin will go through the dots.